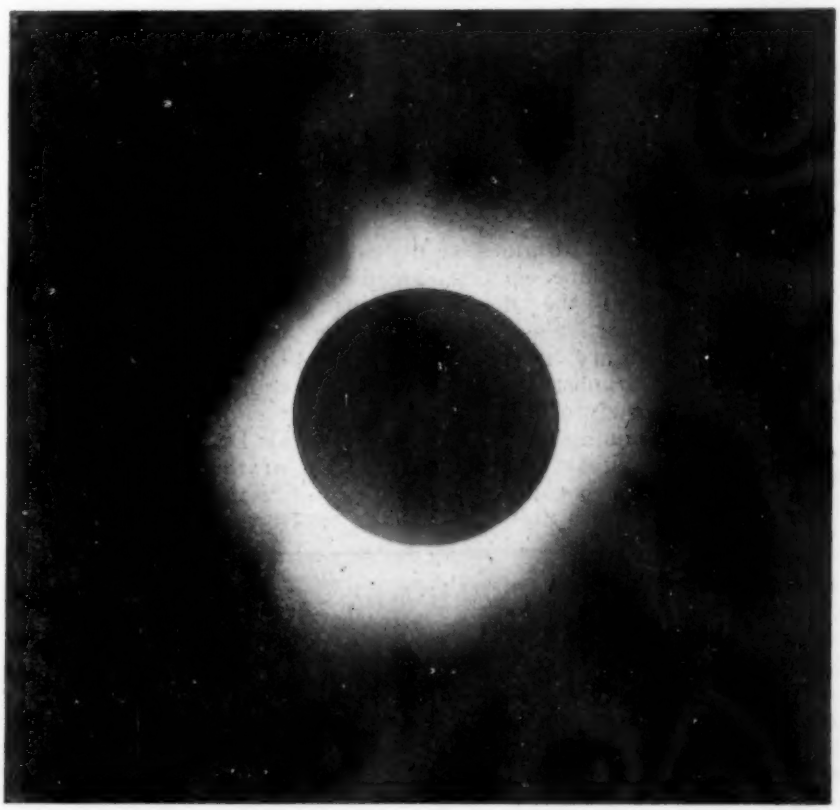
SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

A SCIENCE SERVICE PUBLICATION

$5 a year 15c a copy June 22, 1929



LATEST CORONA PORTRAIT

Recent Eclipse of the Sun as Seen from Iloilo

(See page 382)

Vol. XV No. 428

Law Commission Must Gather Own Facts

Sociology

Both cause and cure of crime are the concern of the National Commission on Law Observance and Enforcement. Some members of the Commission are charged with finding whence crime arises, the other portion is primarily concerned in treatment of the malady after it infects the individual.

Unlike a commission sitting upon the state of a treasury, this Commission cannot call upon any Government Bureau and receive sufficient accurate figures and facts upon which to proceed. If the dollars in the treasury and banks of America were studied, if the cases of smallpox were being considered, then the commission would have available to it Treasury or U. S. Public Health Service reports not older than yesterday or last week.

But as it is, this Commission must also act in the capacity of a fact-gathering agency if it is to have up-to-date and reliable data on which to base its decisions.

The Census Bureau, for example, gathers certain statistics in regard to the sex, age, race, birthplace, and offense of the prisoners in Federal and state prisons and reformatories and in jails and workhouses. Yet the latest available published report of the Census Bureau on this subject contains figures for January 1, 1923. A later report is now in page proof, and will be available in the course of a few months, but this report contains statistics which were true in 1926—three years ago. And three years in the history of crime is sufficient to change the whole aspect of the problem. Other statistics are in many cases even less helpful.

Many theories, advanced by the country's best criminologists—some within the past few months—as to both the cause and the possible cures for crime, will have to be digested by the Commission.

Dr. Harry H. Laughlin, of the Carnegie Institution of Washington, has told the Committee on Immigration of the House of Representatives that we are importing a large portion of our criminal class. Theoretically, our rules for the exclusion of undesirable aliens should keep out all or practically all the criminals who wish to enter the country. Dr. Laughlin, however, found that this has not been accomplished. We have almost as many foreign-born criminals as native-born, in proportion to the total number in the country. And the surprising part about it is that many of these foreign immigrants who become dependents in our prisons cannot be deported because they have become naturalized. It may seem strange that a judge would grant citizenship to anyone who had been convicted of a violation of our laws, but the reason given in such cases is that the violation of certain laws, such as the prohibition law which does not exist in the immigrant's homeland, is not necessarily an indication of moral turpitude.

Other interesting theories recently expounded to account for the prevalency of crime are that in many criminals the emotions are disordered, or that the ductless glands are not functioning properly. The former theory has been advanced by Dr. L. Grimberg as a result of a clinical study of five hundred delinquents, or criminals in the making, and by Dr. William J. Hickson, director of the Psychopathic Laboratory, Chicago Municipal Court, after a twelve-year study during the course of which over 40,000 criminals were examined.

That the mal-functioning of the ductless glands accounts, at least in large part, for the development of criminals, is the theory of Dr. Max G. Schlapp, director of the New York Children's Court Clinic, who has also had considerable experience in the physical examining of juvenile delinquents.

The migration of our population from the country to the city, increased leisure, the new ease of getting away from the scene of a crime afforded by the automobile, the widespread disregard of law and disrespect of law which has become evident since the enactment of the strict prohibition laws—these are a few of the multitudinous factors that must be given consideration by the National Commission on Law Observance and Enforcement.

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Corona Photographed

Astronomy

The latest view of the corona, million mile deep outer layer of the sun, is shown on our cover this week. This picture is one of the first to reach the United States from the scientific parties observing the eclipse on May 9. It was made by Dr. R. L. Waterfield, who, with Dr. W. E. B. Lloyd, of Cambridge University, set up a temporary eclipse observatory at Iloilo, near the party from the U. S. Naval Observatory.

In the center of the picture is the dark disc of the moon, covering the inner part of the sun, the glare of which ordinarily prevents a view of the faint corona. Since modern eclipse observations have been made, the corona has been seen for a total time of less than an hour, so that its exact nature is still largely a matter of speculation. But it is known to be of very low density, and probably contains some solid particles which reflect the sun's light. Its total brightness is about half that of the full moon.

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In This Issue—

SCIENCE NEWS-LETTER, The Weekly Summary of Current Science. Published by Science Service, Inc., the Institution for the Popularization of Science organized under the auspices of the National Academy of Sciences, the National Research Council and the American Association for the Advancement of Science.

Edited by Watson Davis.

Publication Office, 1918 Harford Ave., Baltimore, Md. Editorial and Executive Office, 21st and B Sts., N. W., Washington, D. C. Address all communications to Washington, D. C. Cable address: Scienserve, Washington.

Entered as second class matter October 1, 1926, at the postoffice at Baltimore, Md., under the act of March 3, 1879. Established in mimeographed form March 13, 1922. Title registered as trade-mark, U. S. Patent Office.

Subscription rate—$5.00 a year postpaid. 15 cents a copy. Ten or more copies to same address, 5 cents a copy. Special reduced subscription rates are available to members of the American Association for the Advancement of Science.

Advertising rates furnished on application.

Pollution Menace to Our Drinking Water

Hygiene

By Jane Stafford

The water supply of our country is threatened. Pollution, a danger worse than flood or drought, menaces it. Refuse, acids, tons and tons of solid matter, all teeming with millions of disease germs, the discharges from factory and home, are dumped into lakes and rivers, there to kill the fish and ruin the water for further use.

The danger is not apparent to the average citizen, who now glibly turns on the faucet and gets a drink of fresh, clear, germ-free water. He does not know that he cannot go on doing that indefinitely unless steps are taken soon to meet and conquer this growing menace which threatens one of the mainstays of his existence. But sanitary engineers throughout the country are alive to the danger and are scheming and working to safeguard the supply of precious water which Mr. Average Citizen uses so lavishly and so heedlessly.

At present the industrial waste of 85 per cent. of the population of the country goes into our streams and lakes without any treatment of any kind, either to neutralize the acids or to dissolve the solid matter or to kill the bacteria, according to Abel Wolman, chief engineer of the Maryland State Board of Health. The time is not far distant when the streams of the country will become so polluted that they cannot be used for sources of water supply. Untreated domestic

ACTIVATED SLUDGE treatment plant: aeration tank

sewage and industrial waste are being dumped into the streams with reckless abandon, while filtration and water purification plants are enlarged and duplicated in frantic attempts to reclaim the water from the germs and solid filth that pollute it.

The motor tourist is already aware of the sad state of our waterways. No longer can he hope to catch his breakfast from the stream by which he makes his evening camp, because the heavy pollution of the streams is killing off the fish. Neither can he safely use the stream for his drinking water. It is so turbid and dirty looking that he does not even care to bathe or swim in it.

THE PUBLIC DEMAND for outdoor recreation is helping in the fight against stream pollution

In the coal country, acid iron waste from both active and inactive mines pollutes the stream, killing all forms of life, discoloring the soil of stream bed and bank, and preventing the growth of plants or animals. In factory districts acid and phenol waste constitute the chief problems. Inhabitants of river basins in such districts are complaining of the peculiar, medicinal taste of their water. And the factories are complaining that the water ruins their high-pressure boilers. In all parts of the country domestic sewage adds dangerous germs and distasteful filth to the rivers and lakes.

Water purification plants must now be installed and operated at great cost by quite small towns that depend on the local river for their water supply. In many places the limit at which the purification plant can make the water safe for drinking has been reached. That limit is not far off in other localities. In Ohio a number of water purification plants are operated in duplicate. Double coagulation, double settling and double filtration are in progress. This cuts down on the total loading of the water supply plant as far as bacterial pollution is concerned. But even this process cannot long keep up with the rate of pollution.

Many streams can no longer be used as sources of public water supply. Pennsylvania, for example, has classified her streams according to three grades. In the first are those already so badly polluted that no attempt will be made to purify them and they are virtually abandoned as a source of water supply. The second class contains streams of borderline conditions and here some attempt is being made to recover the purity of the stream. In the third class are streams still totally free from pollution. The state now prohibits the dumping of any untreated discharges into streams of this class.

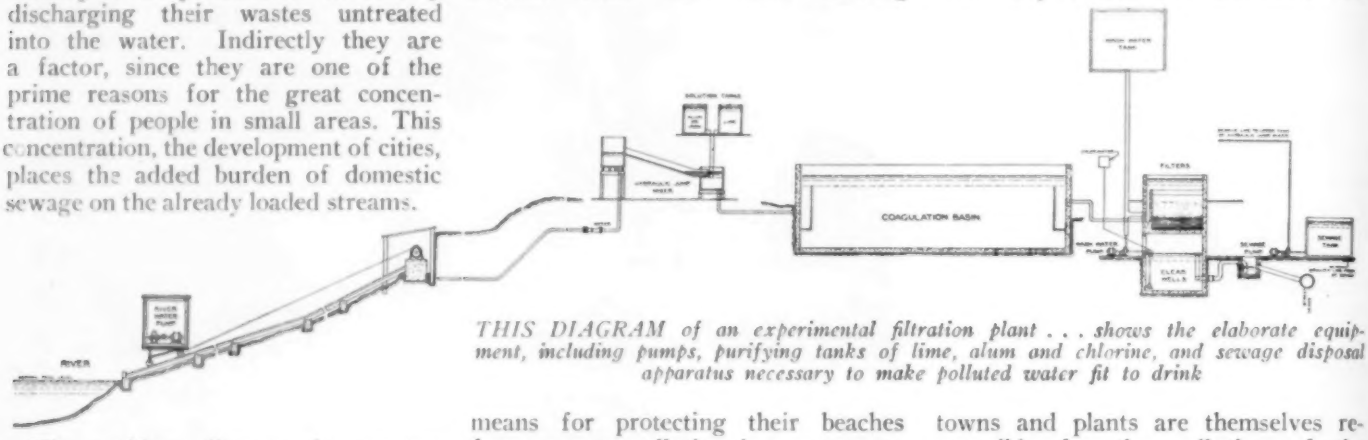
Albany, N. Y., for many years struggled with the problem of water purification, using the Hudson River as the source of her water supply. Finally this was given up. No practicable amount of water purification could keep up with the pollution of the Hudson at Albany, and the city is now getting its supply from another source. Other cities, however, are frequently dependent on a single source of public (*Turn to next page*)

Pollution Menace to Our Drinking Water—*Continued*

water supply. When a town's neighbors upstream dump untreated waste into the water, that town must treat and purify or find another source of water supply.

This critical condition of our streams has come about chiefly because of the urbanization that has been going on in the country since 1890. Factories themselves contribute directly to the pollution of streams by discharging their wastes untreated into the water. Indirectly they are a factor, since they are one of the prime reasons for the great concentration of people in small areas. This concentration, the development of cities, places the added burden of domestic sewage on the already loaded streams.

Fortunately this demand for esthetically attractive drinking water has done much to stimulate communities to take steps toward sewage treatment. Another such helpful factor has been the increased demand for outdoor recreation, particularly bathing beaches. The New Jersey resorts along the Atlantic Coast and the cities from Los Angeles south on the Pacific Coast have been devising



THIS DIAGRAM of an experimental filtration plant . . . shows the elaborate equipment, including pumps, purifying tanks of lime, alum and chlorine, and sewage disposal apparatus necessary to make polluted water fit to drink

means for protecting their beaches from sewage pollution in response to this popular demand for the beaches for recreational purposes.

Sportsmen and fishermen have been demanding sewage purification for some time. They go so far as to insist that the water of all streams be returned to its original pristine state, regardless of cost in sewage treatment and disposal. This extreme demand is not entirely practicable, but certainly one can appreciate their dismay at the present fishless condition of so many of our streams and lakes. The fish that do survive the pollution have a hard time.

In a certain stretch of the Illinois River, where it runs through a thickly populated industrial section, only one sturdy species of fish now is found. Lately it was discovered that these fish were suffering from a peculiar condition resembling rickets in human beings. Scientists believe it is caused by a lack of greens in the fish diet. The aquatic vegetation which might serve as green forage for the fish has been depleted in the same stretch of river and during the same period of time that the fish developed the rickets-like condition. Pollution of the river was undoubtedly responsible for the shortage of green stuff just as it drove all but this one species of fish from that part of the river.

Finally, the factories themselves are demanding sewage purification of their neighbors upstream. The modern development of extremely high-pressure boilers makes a pure-water supply imperative for most industrial operations. So now not only sportsmen and domestic users of water, but industrial plants as well are calling on state boards of health for purification of the water supplies. It often amounts to pot calling kettle black. For many of the most insistent of the towns and plants are themselves responsible for the pollution of the water supply of the next town or plant downstream. In a few localities they have been made to realize this fact and are getting together to solve the problem in cooperation for the entire watershed area.

Cooperation on a national scale is needed. Because of our many independent political units, legislative measures cannot accomplish much. A state may pass a law prohibiting dumping of untreated waste into the state's waterways. But this will not greatly lessen the pollution of those waterways if the next state upstream does not treat its sewage.

A stream will purify itself under certain conditions. But the growth of modern industry, which depends heavily on water power, has brought factories and towns to the rivers in such numbers that there is not space between them for the stream to rid itself entirely of the heavy load contributed by these factories and towns. Stream pollution is not measured in miles but in hours. The towns may be many miles apart, but a swift current carries the water from one town to the next in a few hours, a much shorter period of time than is required for the stream to purify its heavy load of pollution.

Every body of water has a measureable capacity for taking care of a certain amount of domestic and industrial waste. (*Turn to next page*)

The problem all over the country is becoming acute. The Schuylkill and Delaware rivers supply the public water for Philadelphia. The Ohio River system supplies from 12 to 20 large cities. Chicago, Toledo, Cleveland, Buffalo, Detroit and Whiting, Ind., are some of the large cities depending on the Great Lakes for their public water supplies. All of these cities are getting to the point where it will be impossible for them to take their water supplies from the present sources with either safety or esthetic advantages such as taste, odor, color and clarity.

In this connection we have added to the present immensity of the problem the fact that within the last 25 years the demand in the United States for esthetically superior water has changed almost completely. In other words, we are much fussier about the kind of water we drink than were our fathers. We demand water that is not only free from disease germs, but bright and clean with a pleasant taste or lack of taste, and with absolutely no odor. We are no longer content to draw water from our taps into large pitchers and let the sediment settle before drinking. We have always been known as a nation of water drinkers, and we have grown extremely particular about our national beverage, now more than ever, perhaps, since we are denied certain beverages of other countries.

Pollution Menace to Our Drinking Water—*Continued*

This varies with every stream and every kind of waste. Roughly this capacity is measured by determining how much oxygen the normal discharge of every individual in the community demands from the stream.

In treating water for modern industrial and domestic use we have three main considerations. The first is hygienic and is concerned with the maximum bacterial load which our present methods of water treatment can take care of. On the physical side must be considered that maximum load of suspended solid matter which streams can have and still be successfully treated. This aspect is an important one in cities like St. Louis, where the water supply comes from rivers that have a high content of solid matter, such as the Mississippi-Missouri system has. In these cities new devices are now employed to remove the tons of clay that are taken in with the city's water. Flood or high water fills the purification plants of such cities with so much clay and mud and other solid matter that they cannot function. The third consideration is chemical and includes such factors as hardness, acidity, corrosive properties of the water, etc. Water treated for some industrial plants now has a dizzying number of things done to it to make it suitable for feeding into the new high-pressure boilers.

However, all these measures for purification and treatment are cures, and not always successful ones, for the evil after it has come about. Preventive measures must be taken. The safety and future of our water supplies depend on treating sewage and waste before it is dumped into the stream. This is an expensive process. Treatment of domestic sewage costs anywhere from $10 to $15 per year per person. Treatment of industrial waste is also costly, but in many cases enough valuable material may be recovered to justify the expense, even to increase the profits of the firm. Mountains of potash, tons and tons of acids and other chemicals are thrown away every year in the discharges from industrial plants. Such factories as have been forced to treat their sewage before dumping have nearly always found that they could greatly increase their profits by the amount of material reclaimed from their waste. They had been literally throwing thousands of dollars into the streams every year. Complete treatment of sewage is not always necessary and where it is not necessary it is just as inadvisable to carry it out as it is disastrous to neglect it where really needed.

Engineers are able to advise factories and towns as to whether or not they must treat their discharges. They are even able to prophesy in advance, judging from the growth of the town, when it must undertake sewage treatment. The Bureau of Sanitary Engineering of the Maryland State Board of Health, for example, makes tests at points every five miles of the Potomac River from its source to the District of Columbia. The Potomac is one of the chief sources of water supply for Maryland and the Bureau is keeping close watch on it to see how it is affected by the wastes from the industrial towns along its course. Already the Bureau has warned one large city on the upper reaches of the river that within five years it must put in the first unit of a sewage treatment works, because the Bureau from its surveys can prophesy when the stream will reach its maximum load for self-purification and when the towns below this city will need additional protection from their rapidly growing neighbor.

In various sections of the country the problem is being handled in various ways. So far, of all the major cities of the country, that is, cities of over 100,000 population, that are doing anything to treat their sewage before discharging it into their streams and lakes, only two, Chicago and Baltimore, do anything more than settle the sewage solids.

In the far west stream pollution is very closely bound with water conservation. Where water of any character is scarce, it is highly important that it be kept free from pollution. Waste water, after it has had some preliminary treatment, can be put to some use. The city of Pasadena is selling its sewage effluvient, after treatment, to other communities for irrigation. When the bacteria have been killed, this material may safely be used to irrigate crops and gardens.

The Pacific Coast cities have been solving their problem of beach pollution by condemning and then buying up strips of land along the coast and operating municipal beaches, free from pollution. They have progressed faster than the Atlantic resorts, chiefly because of the economic aspect. On the Pacific Coast the bathing beaches constitute one of the major industries of the region.

The Milwaukee sewage treatment plant is noteworthy because it is one of the few such plants that is not operated at a total loss from a monetary standpoint. Here fertilizer is recovered from the sewage. This is sold and helps to pay for the operation of the plant. New York City with her nine million inhabitants, her huge factory belt, and the large nautical population of her harbors, is faced with a tremendous problem. Already she is looking toward the Delaware River as a source of the public water supply. Negotiations with Pennsylvania and New Jersey have been going forward on this project. Meanwhile, the city is now planning the largest sewage treatment plant in the world, the conditions of the city's harbors and beaches having reached the point where this step must be taken. The new plant will be located on Ward's Island. To insure safety of her own water supply, New York City has for some time been installing and operating sewage treatment plants in a number of small towns and cities in the watershed area on which the great metropolis draws for her public water supply. The cost of installation and upkeep of these plants is paid by New York City.

Great strides have been made under the Ohio River Basin Interstate Stream Conservation Agreement. This has been a purely voluntary attempt by the interested parties to substitute for an official regulating agency for the entire Ohio River Valley. The organization has no legal power but has been able, by bringing pressure, to secure treatment of phenol waste in almost 99 per cent. of the plants approached during the three years the agreement has been in force. Phenol pollution is one of the biggest in the entire range of industrial waste pollution.

Systems like this have the greatest chance of accomplishment, Mr. Wolman believes. They follow the plans so successful in England and other European countries, where complete control of an entire watershed area is vested in one board of governors, regardless of the political divisions occurring in the area. Before such an arrangement can be put into operation here, group cooperation among industries might be fostered. *Science News-Letter, June 22, 1929*

Youthful Killers May Be Insane

Psychiatry

The recent out-cropping of cases in which young boys from 6 to 16 have seized guns and killed or dangerously wounded playmates, has roused the interest of all persons interested in child welfare and the prevention of crime. The extremely serious offense of murder cannot legitimately be classed with the common delinquencies of childhood. It seems to demand special treatment; yet judges differ as to the proper disposition of these cases of what might almost be called kindergarten crime.

One boy of six, Carl Mahan, of Kentucky, was sentenced to the reform school until he should be 21. This sentence was appealed. Another boy, James Harrison of Springfield, Ill., was left free when at the age of five he had killed an infant. Now, at the age of 9, he is charged with the death of another child.

Dr. Nolan D. C. Lewis, psychiatrist on the staff of St. Elizabeth's Hospital, a U. S. Government hospital for the insane, advises a thorough psychiatric examination for every child who exhibits abnormal behavior, especially such extremely abnormal behavior as murder.

"Any boy who commits murder is abnormal," said Dr. Lewis. "And he may be a victim of dementia praecox —the insanity of youth."

Dr. Lewis believes that the dementia praecox patient is born with the disease and that the active phase of it may appear at any time after birth. Definite cases have been observed as early as six years. And any dementia praecox patient is likely to become violent.

The disease can be detected, in the early stages, only by very careful psychiatric and physical examination, but certain definite physical symptoms, such as unusually small blood vessels, have been found to indicate that the malady is present even though it may be in a latent stage. When discovered soon enough, dementia praecox has been found to yield to treatment; the progress of the disease has been arrested and violent outbreaks prevented.

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A New Explanation

Pathology

LUCIO, in the Manchester (England) Guardian:

("One is just as likely to have dyspepsia from the nagging of a wife or husband as from a gastric ulcer."—Dr. Bernard Hollander in an address to the South Place Ethical Society.)

Ye roisterers and men who feast by night,
Men who will seize on any small excuse
That may, perhaps, explain the morning plight
Of those who have abused the Wine-God's juice,
Behold! . . . The greatest get-out ever seen
Since wine was red, cloths white, or smilax green!

Oft in the past have erring men and weak,
Following their own more uninstructed ways,
Been heard, when breakfast seemed a trifle bleak,
To blame it on the salmon mayonnaise;
"I must not take it any more, I see—
It does not, after all, agree with me."

Why blame it on the salmon as of yore
When rising in the morning somewhat hipped?
O! what was that which disagreed still more
Than any fish that ever swam or flipped?
Whose was that voice that chilled the gastric game
And froze the whole digestive function's aim?

Whose were the words that turned the evening cold
When homewards sped the warrior to his couch?
Sinner, though rising far from brisk and bold,
Go down to breakfast free from cringe or slouch.
Reflecting, "Gosh! though far from well I be,
It was my wife that disagreed with me!"

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More Modest Man

Philosophy

NATHANIEL SCHMIDT, in *World Unity* for June:

In every field the pursuit of science and its main results have had a tendency to produce a change of attitude toward the universe and to the problems with which it confronts us. Some of the most marked effects may be indicated. The advance of science has tended to make us more modest. Man obviously does not hold as significant a position in the universe as he once supposed. Though his knowledge grows from day to day and is capable, in a measure, of verification, it is fragmentary, relative, and subject to constant revision. Dogmatism is out of place, loud affirmation not permissible.

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Four Lines for Cancer Research

Medicine

In a report never before made public, the sub-committee on cancer research appointed by the conference of consultants called by the Surgeon-General of the U. S. Public Health Service, suggested that the Public Health Service could carry on cancer research along four lines: statistical study, study of occupational cancer, study of the general biochemistry of the cell, and study of various phases of radiation. This is the report which Senator Wesley Jones, chairman of the Senate Commerce Committee and its new cancer subcommittee, has mailed to scientists throughout the country in order to get their opinions. Later it will be discussed at the hearings of the cancer subcommittee.

"The United States was the first government to publish a statistical volume on the mortality from cancer," stated the report. This volume gives all the facts obtainable from the Census records up to 1914. It should now be complemented by another volume covering the time since 1914, the committee advised. The study of occupational cancer cannot be carried on by private institutions so well as by the government, because the material is so widely scattered.

"For example, we know but little of the cancers of tar workers in the United States," stated the report, "of the occurrence of cancer in garage workers, whose hands are continually in contact with oils; of the spatter-burn cancers seen in workers in the steel mills; of brass and dye workers' cancer. If the widely scattered information concerning these types of cancer could be collected and studied, facts important both to the problem of the causation of cancer and to industry would be immediately obtainable."

More fundamental researches on the general biochemistry of the cell which might be carried out in existing laboratories were summarized as follows:

"Tissue cultures offer one method of approaching this problem. We still lack information as to the difference between the cancer cell and the normal cell. If cancer cells and normal cells can be grown continuously in culture and the difference noted between the two, either in morphology or in response to radiation, or to physical or chemical agents, it might lead to the discovery of methods, chemo-therapeutic or other, which would damage the cancer cells and leave healthy cells untouched. If this happy discovery could be made we would be approaching a cure for cancer. Similar general biological work should be encouraged at institutions like the Marine Biological Laboratory at Woods Hole, which would lead to greater knowledge of the cause of growth and death of cells. Any investigation of this type may well be expected to throw light upon the cancer problem which is largely an understanding of the uncontrollable growth of certain groups of cells in the human body."

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The largest and richest emerald mines in Colombia are the property of the Colombian government.

All types of athletics have been brought under government control in Italy, and physical training for children under 17 years is now compulsory.

Senate to Probe Cancer Research

Medicine

Is there anything which the U. S. Government can do to aid science in its battle to find the cause and cure of cancer?

The Senate of the United States wishes to learn the answer to this question, and in order to get it, a subcommittee of the Commerce Committee is beginning hearings, at which Surgeon General H. S. Cumming of the U. S. Public Health Service, and perhaps other scientists will appear.

The hearings are due to the passage recently of the Harris resolution, whereby the "Commerce Committee of the Senate or a subcommittee thereof, is authorized and directed to make a thorough investigation of the means and methods whereby the Federal Government may aid in discovering a successful and practical cure for cancer, and to report to Congress as soon as practicable the results of such investigation together with its recommendations for legislation and appropriations."

Senator Wesley Jones, chairman of the Commerce Committee, who will also be chairman of the cancer subcommittee, states that he is not sure at this time that the Federal Government can or should make any special appropriations for the cancer work.

"Many individual institutions are doing splendid work," he said, "and sometimes we get better results by not expanding in too many directions. However, if there is anything the government can do, and any appropriations which ought to be made, we want to know it, so that we can act accordingly."

Specialists from all over the country will be called before the committee, other members of which are Senators Harris of Georgia, Vandenburgh of Michigan, McNary of Oregon, and Copeland of New York, the latter being a physician.

One of the first steps to be taken by the cancer subcommittee is to obtain from Surgeon General Cumming a list of medical men and surgeons who attended a cancer conference called by the Public Health Service in April, 1928.

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Sun Relics in Exhibition

Archaeology

Sun baskets, little Sun-god images, and shields bearing symbols of stars and sun are among the Indian relics which the United States is sending to the Institute of Actinology at Paris this summer. The institute is to display the therapeutic activities of light, and also exhibits showing the attitudes of people of the past in regard to the sun.

There appears to be no reason to believe that the American Indians took sun baths or understood the therapeutic value of sunlight, according to Dr. Walter Hough, of the U. S. National Museum, who is preparing the Indian exhibit. But practically all the Indians had a sun cult and looked upon the sun as a source of great power. Articles selected for the Paris exhibition will illustrate chiefly this aspect of Indian life. The Pueblos of the Southwest dedicated their children to the sun at its rising in a beautiful ceremony, Dr. Hough points out. The Pueblos also used in their ceremonies wands that were painted to represent the sun, the clouds, rain, and corn.

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Forecast Hauls of Mackerel

Ichthyology

By LEWIS RADCLIFFE
U. S. Deputy Commissioner of Fisheries

At this season of the year, the mackerel seiners at Gloucester and other fishing ports are busily engaged in outfitting their boats for the southern fishery and the lover of fresh mackerel is looking forward to the day when the freshly caught fish will appear on his menu. The fisherman is at sea as to whether mackerel will be abundant again this year, and later the cold storage man will be at a loss to know whether he should buy for freezing at current prices, or defer such action, hoping for an abundant supply at lower prices later on in order that we may have our mackerel the year round. Naturally, mature information on the probable abundance of fish will benefit the trade in making their plans for the season, subtracting uncertainties and contributing to the stability of industry and therefore to keeping down the price of the fish to you and me.

The supply of such pelagic or surface swimming fishes as mackerel and herring is largely dependent upon unusually favorable conditions in certain years which augment the stocks in the sea and provide good fishing as long as such rich year classes remain abundant. Additions to the supply in intervening years are too small to maintain a large fishery.

From 1860 to 1885 an annual catch of more than 70 millions of pounds of mackerel on our North Atlantic coast was not uncommon and occasionally as much as 100 million pounds were taken. Then a sharp decline set in and for forty years annual catches of from 5 to 25 million pounds have been the rule.

As a result of a fairly large brood in 1921 and an even better one in 1923, mackerel reappeared in abundance in the catches beginning with 1925. In that year the catch was 34 million pounds and in 1926 47 million pounds, declining to 42 million pounds in 1927, and 31 million pounds in 1928. Thus we are able to observe the rise and fall of the catch from two rich year classes. Evidently unless another rich year class appears, the catch will continue downward to the 40-year level between 1885 and 1925.

Fortunately the 1927 year class appears to have been good, but just how rich it is too early to estimate. In 1928 it contributed over 1,600,000 pounds of "tinker" size mackerel and this year's catch will reveal more definitely how abundant the 1927 brood is. This year the 1927 brood will be two years old, weighing about one pound, whereas the 1923 fish will weigh two pounds or more.

O. E. Sette of the U. S. Bureau of Fisheries has been studying the mackerel fishery, analyzing each year's catch and assembling a fund of information which will be helpful in forecasting the abundance of mackerel. A year ago he predicted a falling off in the 1928 catch of not less than 12½ per cent., and now predicts a further decline of 30 to 50 per cent. in the catch of the older fish of 1923 brood. As the relative abundance of the 1927 year class cannot yet be estimated, it is unsafe to predict the total catch for 1929. If it is as rich as the 1923 year class, we may have another record catch in 1929, made up largely of two sizes or age groups, one measuring 14 to 15 inches in length, and the other 16 inches or more.

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Automobile trucks that burn charcoal gas instead of gasoline have been introduced into Chile, and are pronounced very economical.

A new device attached to a front door lock switches off the hall light inside the house when you lock the door, and lights the light when you unlock the door.

Automobile drivers in Peru must pass a complete psychological and physical examination, and must repeat the test every six months, in order to prove that their original qualifications are maintained.

The only states not included in the birth-registration area are New Mexico, South Dakota, and Texas.

Florida spent more on public schools in 1926 in proportion to her annual income than any other state.

Civil airports will be the forts of the nation in future emergencies, a government aeronautics official predicts.

A fossil tusk seven feet long, belonging to a prehistoric mammoth, has been found in Alaska and presented to the Field Museum.

CLASSICS OF SCIENCE: Smithson the Chemist

Chemistry

The founder of the Smithsonian Institution, who died one hundred years ago this week, was one of the cleverest chemists of his time. There is a story that he once caught part of a tear as it rolled down a lady's cheek and analyzed it, proving that it contained several salts, but chiefly "muriate of soda." The test for chlorine here given refers to such an analysis.

ON THE DISCOVERY OF ACIDS IN MINERAL SUBSTANCES. By James Smithson. From Thomson's Annals of Philosophy, Vol. XXI; New Series, Vol. V. 1823, *page* 384.

April 12, 1823.

SIR: Acids, it is well known, have been repeatedly overlooked in mineral substances, and hence dubiousness still hovers over the constitution of many, although they have formed the subjects of analysis to some of the greatest modern chemists.

To be able to dissipate all doubts —to ascertain with certainty whether an acid does or does not exist, and, if one is present, its species, and this with such facility that the trial may be indefinitely renewed at pleasure, and made by all, so that none need believe but on the testimony of his own experiments, is the degree of analytical power which it would be desirable to possess.

So far as I have gone in these reports, I here impart.

As the carbonates of soda and of potash precipitate all the solutions of earths and metals in acids, so do they decompose all their salts by fusion with them. Fusion with carbonate of soda or potash affords there a general method of separating acids from all other matters.

Lead forms an insoluble compound with all the mineral acids except the nitric. It may consequently be immediately known whether a mineral does or does not contain an acid element by the carbonate of soda or potash, with which it has been fused after saturation by acetous acid, forming or not forming a precipitate with a solution of lead.

If the production of a precipitate proves the presence of an acid, the determination of its species will present no great difficulty.

1. *Sulphuric Acid.*—If the alkali which has received it from the mineral is fused on charcoal, and then laid in a drop of water placed on silver, a spot of sulphuret of silver will be produced, as I have stated on a former occasion. Bright copper will likewise serve for this purpose.

James Smithson

Fusion in the blue flame will often be sufficient to deoxidate the sulphur.

It is needless to observe that the alkali used in this trial must itself be perfectly free from sulphuric acid. When such is not possessed, its place may be supplied by Rochelle salt, or by cream of tartar.

2. *Muriatic Acid.*—I have likewise discovered a test of chlorine, and consequently of muriatic acid, of delicacy equal to the foregoing. If any matter containing chlorine or muriatic acid is laid on silver in a drop of solution of yellow sulphate of iron, or of common sulphate of copper, a spot of a black chloride of silver, whose colour is independent of light, and which has not been attended to by chemists, is produced. The chlorine in a tear, in saliva, even in milk, may be thus made evident. When the quantity of chlorine in a liquor is very small, a bit of sulphate of copper placed in it on the silver is preferable to a solution. To find chlorine in milk, I put some sulphate of copper to it, and placed a small piece of bright silver in the mixture.

3. *Phosphoric Acid.* — The alkali containing it, after saturation by acetous acid, gives a sulphur-yellow precipitate with nitrate of silver, which no other acid does. The precipitate obtained with lead crystallizes on the blow-pipe. M. Berzelius's elegant method of detecting phosphoric acid is universally known.

4. *Boracic Acid.*—Its presence in carbonate of magnesia, and in some other of its compounds, is indicated by the green colour they give, during their fusion, to the flame of the lamp.

M. Gay-Lussac has observed that a solution of boracic acid in an acid changes the colour of turmeric paper to red, like an alkali. Borax, to which sulphuric acid has been put, does so, and the same is of course the case with a bead of soda containing boracic acid.

The most certain test of boracic acid in a soda bead, &c., is to add sulphuric acid to it and then spirit of wine, whose flame is coloured green, if boracic acid is present.

5. *Arsenical Acid.*—Alkali containing it produces a brick-red precipitate with nitrate of silver.

6. *Chromic Acid.* — Chromate of soda and its solution are yellow, and so is the precipitate with lead. That with silver is red.

Chromate of soda or potash fused on a plate of clay leaves green oxide of chromium.

Chromate of lead fused on a plate of clay produces a very dark-green mass, which is probably chromate of lead; with an addition of lead, it forms a fine red, or orange glass.

Lead added to the green oxide left by chromate of soda on the clay plate, dissolves it, and forms an orange-coloured glass.

The green oxide of chromium sometimes acts the part of an acid. I have seen a combination of it with oxide of lead found in Siberia, in regular hexagonal prisms, having the six edges of the terminal face truncated (Haüy, pl. lxviii. fig. 63); melted with lead on the clay plate this would undoubtedly produce the orange glass; and fused with nitrate of potash it would form chromate of potash.

7. *Molybdic Acid.*—If molybdate of soda or potash, or, I apprehend, any other molybdate, is heated in a drop of sulphuric acid, the mixture becomes of a most beautiful blue colour, either immediately, or on cooling.

The solution of molybdate of soda in sulphuric acid affords with martial prussiate of potash, a precipitate of the same colour (*Turn to next page*)

Wood Studies May Reduce Losses

Chemistry

No pampered child of the idle rich can claim to receive the tender care given to living wood-rot organisms at the Forest Products Laboratory. Ira Hatfield studies these little plants under the microscope in an attempt to discover some weakness in their life habits which might enable mankind to exterminate them effectively in trees, timber, or wooden structures.

Like children, decay organisms can not exist without water, food, warmth and air. Wood is the food element and water is the life element easiest to control. That is why Mr. Hatfield is singling out pure strains of the wood-decaying organisms and rearing them under conditions which are as superior to those surrounding the rich man's baby as the baby's environment is superior to that of an alley cat.

"If my observations can determine the least amount of water wood rot can thrive on or the most water it will tolerate," Mr. Hatfield said, "we will then be able to stop decay and rot in wood either by drying the wood until the wood-rot organisms die of thirst or by soaking the wood until the organisms drown."

The organisms at the laboratory must have just as much air as they would have in any lumber yard and there must be absolute assurance that undesirable alien spores of other organisms are not gaining access to the wood on which the pure wood-rot organisms are growing.

In Mr. Hatfield's series of tests the temperature of the growing decay organisms is maintained by incubator. An elaborate ventilation system, which employs both chemical and mechanical means, relieves the air supply of carbon dioxide and excess moisture. A chemical solution detains all the undesirable decay spores which are universally present in the laboratory air as they are everywhere. By means of one chemical solution through which it passes the humidity of the air—and correspondingly the moisture in the wood—is controlled to a fraction of a per cent. The growth of the wood-rot organisms under the artificialy controlled moisture conditions is measured, not by crude physical methods, but by measuring the amount of carbon dioxide given off, just as the work done by an athlete on a physician's treadmill is measured by the amount of carbon dioxide he exhales.

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Smithson the Chemist—*Continued*

that copper does. Tincture of galls gives with this acid solution a green precipitate; but with an alkaline solution of molybdic acid galls produce a fine orange precipitate. If an alkali is put to the green precipitate, it becomes orange; and if an acid to the orange precipitate, it becomes green.

8. *Tungstic Acid.*—If tungstate of soda is heated with sulphuric acid, the granules of precipitated tungstic acid become blue, but not the solution; and the phenomena cannot be confounded with those presented by molybdate of soda. Martial prussiate of potash has no effect on this acid liquor.

Tincture of galls put to the solution of tungstate of soda in water does not affect it. On the addition of an acid to this mixture, a brown precipitate forms.

If tungstate of soda is heated to dryness with a drop of muriatic acid, a yellow mass is left. On extracting the saline matter by water, yellow acid of tungsten remains. It is readily soluble in carbonate of soda. If taken wet on the blade of a knife, it soon becomes blue. This is made very evident by wiping the blade of the knife with a bit of white paper. Possibly a small remainder of muriatic or sulphuric acid among it is required for this effect.

9. *Nitric Acid.*—Nitrate of ammonia produces no deflagration when filtering paper, wetted with a solution of it and dried, is burned; the salt volatilizing before ignition, most, or all, the other nitrates deflagrate.

If metallic copper is put into the solution of a nitrate, sulphuric acid added, and heat applied, the copper dissolves with effervescence.

10. *Carbonic Acid.*—It is to be discovered in the mineral itself. The application of heat is, in some cases, required to render the effervescence sensible. It has been sometimes overlooked in bodies from want of attention to this circumstance.

11. *Silica.*—A simple and sufficient test of it is the formation of a jelly, when its combination with soda is put into an acid.

It has evidently not been intended to enumerate all the means by which the presence of each acid in the soda bead could be perceived or established. Little has been said beyond what appeared required and sufficient.

Mention has been made above of small plates of clay.

They are formed by extending a white refractory clay by blows with the hammer, between the fold of a piece of paper, like gold between skins. The clay and paper, are then cut together with scissars into pieces about 4-10ths of an inch long, and 2½-10ths of an inch wide, and hardened in the fire in a tobacco-pipe.

They are very useful additions to the blowpipe apparatus. They admit the use of a new test, oxide of lead. They show to great advantage the colours of matters melted with borax, &c. Quantities of matter too minute to be tried on the coal, or on the platina foil, or wire, may be examined on them alone, or with fluxes. Copper may be instantly found in gold or silver by fusing the slightest scrapings of them with a little lead, etc.

Cut into very small, very acute triangles, clay affords a substitute for Saussure's sappare.

James Smithson (1765-1829) was well known as an analytical chemist during his lifetime. He was an intimate friend of Cavendish and much admired by Berzelius, but his chief fame today comes from his will, which started a new fashion in philanthropy. After providing for his servants and leaving his fortune to his nephew, Smithson added, apparently as an afterthought, that if his nephew died without issue the money should go to the United States to found in Washington an institution called the "Smithsonian" for the "increase and diffusion of knowledge among men." The nephew died in 1836, and Congress passed an act accepting Smithson's bequest. Richard Rush went to England, saw the case through the courts, and brought the money, amounting to about half a million dollars, to the United States in the form of gold sovereigns. The sovereigns were taken to the United States mint and recoined into American eagles. Part of the fund was later loaned to some of the new states of the union, and lost, but Congress accepted responsibility for the full amount of the bequest, the interest furnishing the income of the Institution. After much discussion it was decided that a library, a museum, an art gallery, lectures, printed publications and reports, and rewards for important scientific advances all come within the scope of Smithson's phrase. Much of the scientific work of the United States government owes its origin to the work of the Smithsonian Institution.

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Stone Age Irishmen

Archæology

The scientific word battle as to whether Ireland was inhabited by cave men in the prehistoric Old Stone Age appears to be settled, with the Irish cave man's existence victoriously established. E. K. Tratman, of the University of Bristol, has reported the discovery of a human skeleton deeply buried in the earth floor of Kilgreany Cave in Southern Ireland. A stalagmite layer which slowly formed over the body contains bones of the wild boar, Irish giant deer, reindeer, brown bear, wolf, Arctic lemming, and other animals that roamed northern Europe at the end of the Ice Age when the glaciers were retreating to the Arctic regions.

Previous discoveries of crudely chipped stones in Ireland have been hotly argued over, some scientists holding that the stones were tools hacked into shape by primitive human beings of the Old Stone Age, and other scientists maintaining that the stones were chipped by nature or that they were not very ancient. A group of well-known archaeologists, including R. A. S. Macalister, who pronounced adversely on previous discoveries, have announced their "complete acceptance" of Mr. Tratman's discovery and "full appreciation of its importance".

There is absolutely no evidence of any disturbance of the stalagmite layer by the burial inserted from above, Mr. Tratman states in a report of his discovery in *Nature*. Hence, the cave dweller must have been a contemporary of the animals of the Ice Age. No stone tools or weapons have been found in the cave to show the stage of material development attained by the Stone Age Irishman.

In upper layers of earth which accumulated over the burial are remains of later inhabitants of the cave. One layer contains part of a polished stone axe and a number of human skeletons. These men probably lived at the end of the New Stone Age or the dawn of the Bronze Age, it is reported. Still nearer the surface was a hearth of late Bronze or early Iron Age.

Science News-Letter, June 22, 1929

The population in British local prisons has dropped from 20,000 in 1878 to 8,000 today, and the population in convict prisons and preventive institutions has dropped from 10,000 to 1,600.

10 Point Type Most Easily Read

Psychology

Large-sized type does not save the reader's time. On the contrary, it is read more slowly by adults than is type of a medium size. This strange conclusion, which is contrary to the supposition of many advertisers, was reached by Prof. Donald G. Patterson and Miles A. Tinker as a result of a test given by them to 320 sophomores at the University of Minnesota.

The test material consisted of paragraphs of equal reading difficulty printed in 6 point, 8 point, 10 point, 12 point and 14 point type. All the lines were of equal length, 80 millimeters, a little over 3 inches, wider than the newspaper column.

The students' speed of reading was determined for each different size of type, and it was found that the material in 10-point type was read more quickly than either the smaller or the larger type. The difference in number of words read per minute was quite large, especially for the extreme sizes of type. The number of words read per minute from 10 point was 6.2 per cent. greater than from 6 point, 5.2 per cent. greater than from 8 point, 5.8 per cent. greater than from 12 point, and 6.9 per cent. greater than from the 14 point. The 10-point type is the size commonly used in well-printed books, and in the SCIENCE NEWS-LETTER.

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Maya Dentistry

Archæology

Mayan Indians who lived in Central America more than 1,000 years ago practiced dentistry and knew something about the technique of drilling holes in teeth and filling up the cavity with metal. Two teeth containing circular holes filled with iron pyrites are among the significant discoveries reported by J. Eric Thompson, leader of the Capt. Marshall Field Archaeological Expedition to British Honduras, which has just returned to the Field Museum of Natural History.

The teeth were found in a vaulted burial chamber in the ruins of the Mayan city of Tzimin Cax, which means "Mountain Cow." A good collection of Mayan painted pottery was found in the chamber. Other burial chambers yielded skeletons and pottery types hitherto unknown in the Mayan art, also jade ear-plugs and apple-green jade beads.

While digging in a large mound in the ruins of the city the expedition made the first authenticated find of a mirror from a site of the Old Empire of the Mayan tribes, that is, from the period between 400 and 800 A. D., Mr. Thompson states. The object consisted of a number of small squares of iron pyrites, which apparently had made a shiny metal looking-glass with a pottery back. Heretofore, it has been generally supposed that the inhabitants of the early Mayan cities were unacquainted with the use of mirrors.

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Starlings Here to Stay

Ornithology

The European starling is here to stay, whether we like it or not, according to the U. S. Biological Survey. From the 160 birds released in New York City in 1890 and 1891 have come the flocks of unnumbered thousands that are seen periodically roosting in the shade trees of eastern villages and towns. This quarrelsome, untidy stranger is now a thoroughly naturalized member of the North American bird population in regions east of the Mississippi.

Thus far the starling has not developed the destructive food habits that make the bird a pest in Europe and Australia, official records show. Judged by food habits alone, he is a not undesirable citizen. Having a pugnacious disposition, however, he has acquired considerable unpopularity because he drives off other more desirable bird neighbors from bird houses, holes in trees and other available nesting sites, particularly in the vicinity of houses.

If you do not want these noisy gregarious fellows hopping in and out of your dooryard, put up nest boxes with holes less than one and one-half inches across. Experiments have shown that the starling cannot enter a hole of such dimensions so that it is possible to save home sites for some of the smaller birds in this way.

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Wireless transmission of pictures and thumb-prints of criminals from Berlin to other German cities has been tested for a year and found satisfactory.

Skyscrapers of the Future

Engineering

COL. W. A. STARRETT, in *Skyscrapers and the Men Who Build Them* (Scribner's):

What man has done in his building has been to travel in a great circle of evolutionary detail from the communal cave or hut out to the separated family abode, then to the further refinement of the multi-chambered domicile. Then, with the advent of our mechanical age, the tendency has been a return toward communal living, not as a measure of self-preservation such as prompted the earliest communal life, but now as a matter of mutual self-benefit in the attainment of the comforts, conveniences and, indeed, the luxuries of life that modern urban existence offers in such abundance. Hence, our cities; hence our congestion, for convenience of proximity to the sources and origins of these comforts becomes as important as the existence of the comforts themselves. We have seen the swiftness of acceptance of multi-storied structures as soon as the means of producing them were invented. We have seen the enormous wealth their invention and the consequent requirements created. But the basic requirement has remained the same: safe, comfortable, adequate, sanitary and hygienic habitation of about the same dimensions as originally conceived, and certainly about the same objective of conveniences to which primitive man first aspired.

Such retrospection, while it can do little in supplying a clue to our final destiny, can at least be used in considering our ultimate form of structure. We can conceive of no situation that will remove our desire for rooms, well heated, lighted and with sanitary and hygienic conveniences. It is certain that in the cities at least, the grouping of rooms into a single structure has a fixity from which all conjecture must proceed. The demonstrated advantages of common sources of heat, light and water, the common use of thoroughfares, and the universal access to common media of communication indicate that these will ever be extended, but only to serve the basic requirement of human convenience as it remains intrenched in its sheltered and conveniently equipped rooms.

All of these things point in the same direction so far as construction is concerned—ever larger and more efficient structures, with conveniences that will always continue to develop and refine. Good thoroughfare arrangement, with due regard to ease of swift movement from place to place, goes hand in hand with increasing construction. Like our rooms, our city blocks have not greatly changed from time immemorial. True, avenues have widened and straightened, easier circulation has been forced upon us, sometimes reluctantly, but nothing has arisen greatly to change the average requirements, and the city block may be regarded as about fixed. Certain it is that the metropolitan tendency is toward the construction of buildings occupying whole city blocks; already we have many of this kind throughout the land, and the movement is well established as the next great economic phase of construction. The demonstrated economies and conveniences of this latest development herald the advent of the city of single city-block structures.

This leaves only the moot question of height and height limitation to be considered. Limitation of height of metropolitan structures has never been a more acute question than it is today. When the first skyscrapers were built their critics denounced them as structurally unsafe, and dismissed them as capricious, temporary freaks that would soon fall down and thus seal their own doom. When this prophecy was unfulfilled, and one skyscraper commenced to shoulder another along our busy thoroughfares, the hue and cry against them as destroyers of air and light was raised, and to some purpose. Before anything could be done about it, however, some of our most cherished avenues of travel almost overnight became yawning chasms into which the sunlight never penetrated. The law, with leaden steps, slowly focussed its attention upon this condition, and we commenced to get our height limitation and zoning laws. Hardly had this been accomplished when the problem of traffic congestion became the most acute aspect of metropolitan existence, and today that staggering perplexity of city life overshadows every other problem in importance. It almost threatens the very existence of the convenient, if complex, living that our city so ideally serves in all other respects.

It is futile to point the finger of accusation toward any one phase of city life and condemn that phase in particular as responsible. The responsibility is itself a great complexity to which many activities of metropolitan existence contribute. All that may be said is that over-tall buildings contribute some indefinite and undefinable share to the problem, and to some extent height limitation is not only justifiable but necessary. It is a fair guess that the great metropolitan problem of the future will center around height limitation considered in the light of street arrangement and the solution of the traffic problem. Dreamers have vexed the question by injecting the possibilities of aviation into it, and already the fantasy of the skyscraper landing roof is portrayed in our Sunday supplements. The imagined fulfilment of these dreams contributes nothing to the solution of the question, for these fantasies simply add another aspect to it.

As an escape, some theorists are actually visioning an abandonment of the great cities that the skyscraper has made, and the construction of new centers, with Utopian arrangements that seem perfectly to meet the requirements of our many methods of swift communication. Perhaps even these wild conjectures may be realized in some now unthinkable way; but if they are, if new and wholly different cities are built, if new and wholly undreamed-of means of transportation and communication are devised, if wholly different building materials are invented, and refinements of conveniences developed beyond our wildest conjectures, yet the basic human requirement will be the same. Until human nature, and even human existence itself, is changed, that basic requirement will be shelter, light, heat, sanitation, and swift transportation and communication; and architects, engineers and builders will be in demand to study and solve these problems. Truly, building construction is the most fundamental requirement of human progress.

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New apparatus, by which oxygen may be piped from room to room in a hospital, makes it possible to administer oxygen more promptly and frequently in emergencies.

First Glances at New Books

BIRDS OF THE PACIFIC COAST—W. A. Eliot—*Putnam* ($3.50). One hundred and eighteen birds common to the Pacific coast and British Columbia are described, with a brief account of their distribution and habitat, and over fifty color plates. Bird lovers west of the Rockies will want this book, written especially for them.

Ornithology

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PATIENT SCIENTISTS AND OTHER VERSE — Bertha Gerneaux Woods—*University Press, Maryland* (75c). These are sweet, intimate little verses about flowers, children, religion—and one, as the title indicates, about scientists.

Poetry

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THE SPANISH PIONEERS AND THE CALIFORNIA MISSIONS — Charles F. Lummis—*McClurg* ($3). A new edition of a book relating a fascinating and sometimes neglected chapter of history of the Americas. Had Mr. Lummis been with the conquistadores, he could have had no more enthusiasm for their accomplishments.

History

Science News-Letter, June 22, 1929

FIELD BOOK OF AMERICAN TREES AND SHRUBS—F. Schuyler Mathews —*Putnam* ($3.50). To know our native trees is an easy and delightful pastime with a handbook such as this for reference. It is a concise description of species common throughout the United States, profusely illustrated.

Botany

Science News-Letter, June 22, 1929

SCIENCE AND PERSONALITY—William Brown—*Yale Univ. Press* ($3). Based on the fifth series of the Dwight H. Terry foundation lectures at Yale on "Religion in the Light of Science and Philosophy." The author covers a wide range of problems, such as religion and health, suggestion and will, mental analysis and psychotherapy, instinct, sentiment, and value. Two chapters are devoted to personality and psychical research.

Psychology

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GENERAL SCIENCE—W. Dean Pulvermacher and Charles H. Vosburgh —*Globe Book Co.* (educational price: 50 cents). A series of practical and well contrived experiments and questions to go with a course in General Science.

General Science

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Larch Canker Fight

Phytopathology

Encouraged by a Congressional appropriation of $35,000, experts of the Department of Agriculture have outlined a comprehensive campaign to stamp out larch canker, a new tree disease similar to chestnut blight, which threatens timber valued at more than $3,000,000,000.

Dr. Haven Metcalf, in charge of the Office of Forest Pathology and generalissimo of scientific forces battling the disease, has announced that practically all of the 3,100 trees known to be infected have been destroyed. These trees were located in Massachusetts and Rhode Island and comprise, in addition to larches, specimens of the Douglas fir and yellow pine.

An army of men throughout the United States have been instructed to be on the lookout for the disease and have received photographs and descriptions to facilitate their search. This army includes all officers of the U. S. Forest Service, inspection officers of the Department of Agriculture and State officials. These men will report immediately where stands of the yellow pine and Douglas fir are located, particularly east of the Mississippi.

In addition, an accurate check is being made on importations of the three species infected, since the disease came in on trees from Europe prior to enactment of the plant quarantine law in 1918. The customs records are being combed to find where the trees came from so that the department may trace the trees to where they were planted in the United States.

Five men are now working on laboratory studies of the disease, and later in the season this corps will be increased to twenty. Two scientists, Dr. E. P. Meinecke and Dr. Glenn G. Hahn, have been conducting studies of larch canker in Europe, and conferring with experts abroad. The laboratory studies are extremely complicated, owing to the fact that the fungus is one of a group of more than 100 species, whose characters have not been well separated and which are difficult to differentiate.

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The average farm woman lives seven miles from a doctor and 18 miles from a hospital, according to a recent investigation.

NATURE RAMBLINGS

By FRANK THONE

Tulip-Tree

The tulip trees are full of flowers now—beautiful yellow goblets tinted with a little red and green—and the bees are happy in them. The gorgeous magnolias of the South do not venture very far north, but the tulip tree, a fairly near relative, upholds the family traditions through a wide stretch of country well above the Mason and Dixon line.

"Fiddle-tree' is another name it has been called, because of the peculiar leaves with their arched base and incut sides. And the heavy, rough bark, like the bark of cottonwood, has given it the name "tulip poplar", or even "poplar" in other sections. Its scientific name, *Liriodendron,* is Greek for "lily tree." All these cognomens testify to the good esteem in which this fine tree is held wherever it grows.

It is worthy of cultivation as a street and ornamental tree even outside its present native range, for even after the flowers are past its symmetrical crown of deep green, glossy leaves still make a fine showing. And the tree is quite hardy even out into the prairie states. Its only drawback in these windy stretches is that winter storms will sometimes break off branches, for the wood is short and rather brittle.

Though this weakness of its wood precludes it from consideration as a first-rank hardwood, the tulip tree still has a useful place as a timber producer. Its fiber is even and smooth and rather soft, which makes it nice material for the veneer knife. For this reason, and because it is a fast grower, the tulip tree is being cultivated to some extent on cut-over lands in the Ohio Valley, as a regular timber crop.

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Land of Contrasts

Sociology

JOHN HERMAN RANDALL, JR., in *Our Changing Civilization* (Stokes):

. . . Europeans still laugh at our inexperience; for their upper class has had longer to learn the wise use of riches than we sons of pioneers. But though we are still a curious blend of crudity and insight, we are gaining knowledge. We spend millions for sanitation and public health. We have reduced the infant mortality rate to unprecedented figures. We love outdoor sports. Though we tolerate vast stretches of ugliness, we are keenly aware that beauty exists. We may dance to weird strains, but we flock to the best music, listen to famous musicians, and throng the conservatories. Though we flood the world with horrors from Hollywood, we eagerly snatch the great paintings of the past, and even raise up artists ourselves. We perpetuate slums and suburbs, but our architects are as creative as any in the world. We underpay learning, but we have amassed huge libraries, and our scholars are tireless. Though we consume the *Saturday Evening Post* and Harold Bell Wright, we are also the chief support of many a European writer who despises our barbarism. We may devour Frank Crane and Eddie Guest, but our best poets are worthy of their great English heritage. Our theater is a commercial enterprise, but it is as interesting as any in the world. We live on the tabloids, but our news services are unrivaled. We stage monkey trials, but we create tremendous endowments for scientific research. We may not know what it is all about, but we flock to college and we have an unreasoning passion for education. Our schools may be regimented and ridden by politics, but we are trying a thousand experiments. We have an overwhelming self-esteem, but we are our own severest critics. In all these things Europe is aping us as fast as she is able; for our follies and our sophistications are but the natural results of the industrial wealth that is flooding the world. Give us another generation or so, and we may acquire the wisdom to use our vastly greater material resources with something of the discrimination the citizens of ancient Athens or Florence applied to the wealth trade brought them.

For that is the real moral problem that faces us. Where is the wisdom and the intelligence to use the power of science and the machine aright? In our whole moral tradition there is no answer. In all its profound plumbing of the human spirit, Christianity never faced that question. Of what avail is it to tell us to renounce the world, or to abstain from pleasure? We need an ethics of achievement and mastery; we have only an ethics of consolation.

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Real Sea-Serpents

Zoology

E. G. BOULENGER, in *Animal Mysteries* (Macaulay):

The genuine sea-snakes of the "accepted" variety which swarm off the tropical coasts of Eastern Asia are entirely aquatic and extremely poisonous, a property which they possess in common with their not very distant terrestrial relations the cobras and coral snakes. Some fifty different kinds of sea-snakes are known, none of which measure more than six feet in length. They are all possessors of much flattened paddle-shaped tails which as a rule are prehensile, enabling the serpents to secure a firm hold by twisting these organs around coral reefs, sea-weeds, and other objects.

Although they usually are found floating on the waves they can dive to great depths owing to the dilatability of their lungs which are capable of storing large reserves of air. The nostrils, which are valvular and placed on the top of the head, are opened when inhaling air from the surface, and closed when under water. Their prey consists almost entirely of fish which are killed by the action of the poison before being swallowed. A deadly poisonous serpent having free range of the seas might well be regarded as invincible, but sea-snakes have many enemies.

Albatrosses and frigate birds fearlessly seize them and carrying them to some convenient crag or even mast-head, peck and beat them with their wings until they cease to protest, and pass away down the crops of the adventurous birds. Attempts to keep sea-snakes in captivity in northern climes have not been very encouraging.

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Sunlight for T. B.

Medicine

Whether tropical sunlight is more effective in treating tuberculosis than the sunlight of northern climates will be investigated by scientists under the auspices of the Light Research Committee of the American Sanatorium Tuberculosis Association, it has been announced by Dr. Edgar Mayer, chairman of the committee. Dr. Mayer has just returned from the West Indies, where he has made arrangements for sunlight investigations with physicians in Porto Rico, Jamaica, and Trinidad.

Groups of physicists chemists, and clinicians are being organized at various points in the United States and other countries, and these will conduct studies of sunlight for a period of about two years, Dr. Mayer stated.

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T. B. Germ Occurs in Two Forms

Bacteriology

Tuberculosis germs grown artificially may play strange tricks on scientists by occurring in two forms, one being comparatively harmless and the other being very virulent, Dr. S. A. Petroff of Trudeau, N. Y., reported to the National Tuberculosis Association.

Scientists who grow disease germs on a synthetic diet instead of human tissues and cells, favored by the germs, have known that some of the germs so grown appear in two forms, but this is the first knowledge that the germ of tuberculosis plays a dual role. Heretofore, the tubercle bacillus, as it is called in scientific circles, has been considered one of the most stable of germs.

The two forms differ in other particulars besides virulency, but this difference is found in the bacillus of human, bovine, and avian tuberculosis, and in the bacillus used by Prof. Calmette of the Pasteur Institute, Paris, in his famous Calmette-Guerin vaccine against tuberculosis. This unsuspected difference may account for the unsatisfactory results reported by American scientists with the B. C. G. vaccine. A vaccine made from what was supposed to be the harmless tubercle bacilli would have an unfortunate effect on the subject vaccinated if the bacilli suddenly changed to the virulent form. This change may move in either direction, that is, from virulent to harmless or the reverse, and may occur either within or without the human body, Dr. Petroff reported.

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Diagnosis of Heart Disease is Advanced

Medicine

An important physiologic discovery which should help the doctor to tell the patient suffering from heart disease how sick he is, about how long he can live, and what he must do to live that long, has just been reported by Drs. A. R. Barnes and M. B. Whitten of the Mayo Clinic and Foundation. Drs. Barnes and Whitten have announced that it is now possible to tell, in a given case of infarction or obstruction, in the heart, the site of infarction in the left ventricle and which of the main arteries of the heart is involved.

The walls of the heart, just as any other muscular part of the body, must be nourished with blood. For this purpose, two main blood vessels, the coronary arteries, extend over the heart. If an artery is injured, a clot may form in it. Later the clot may work loose from the arterial wall and may be swept along in the blood stream until it reaches a place where the artery is too small to let it through. Then the artery, of course, is plugged. If there are no other arteries to supply blood to the same region, the tissue beyond the plug in the artery is not nourished, and, in a sense, dies. Physicians call these dead places "regions of infarction." When infarction affects the heart muscle the condition is serious and the phenomena that take place in that heart are different from those in a healthy heart.

Among the phenomena that are disturbed by infarction in the heart are the so-called action currents. These are waves of varying electrical potential that are developed as the various portions of the heart muscle contract. Physiologists have known of these action currents for many years, and finally a way was devised of recording them.

The machine that was developed for this purpose is called the electrocardiograph. The essential part is a string galvanometer, or an electromagnet with an almost invisible filament stretched across the magnetic field. When wires are led off from a patient to this filament the filament is deflected as the action currents pass over the heart. These deflections are recorded photographically on a moving film, the film is developed, and then there exists a permanent record of the action currents in the patient's heart. This procedure is done every year in doctors' offices, hospitals and clinics.

Throughout the years investigators have learned the types of heart disease that will produce certain types of records. Their importance is that when certain types of records are obtained, they enable the doctor to be pretty sure whether or not a patient has heart disease, and if he has, to determine whether or not anything can be done about it.

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Two-Thirds Illiterate

Education

Sixty-two per cent. of the population of the world, ten years of age and over, are illiterate. Of a total population of 1,363,900,000, the number of illiterates is 850,500,000. These remarkable figures were obtained through a comprehensive study of illiteracy in the various countries of the world conducted by James F. Abel, specialist in foreign education, U. S. Bureau of Education. In this work Mr. Abel was assisted by Norman J. Bond, statistical assistant.

While only 18 countries report an illiteracy rate of more than 50 per cent., the population of these countries is approximately 618,000,000. Contrasted with this is the total of 468,000,000 inhabitants of all the 45 countries reporting less than 50 per cent. illiteracy.

The United States is included in the group having under 10 per cent. of illiteracy. Porto Rico and the Philippine Islands, however, have a much larger percentage. Porto Rico reports 55 per cent., and the Philippines 50.8 per cent.

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Wire cloth recently exhibited had 160,000 openings to each square inch.

Almost 800 different models of automobiles are now being made in this country.

The Province of Alberta, Canada, expects to spend $1,500,000 on its highways this year.